REMARKS

Responsive to the Final Office Action dated January 29, 2004, Applicants provide herewith an amendment to the cross-reference to related applications section for accuracy of the priority claim, previously of record in the Declaration on file. No new matter or new issues are presented in this Response. Applicants submit the present amendment and remarks, and respectfully request reconsideration and allowance of the remaining claims 21-41.

A. Rejections Under 35 U.S.C. §102(b)/103(a) Combining Japan '299 with Cayle et al.

Claims 21-25, 27-34, and 36-39 were rejected under 35 U.S.C. §102(b)/103(a) as obvious in light of Japan '299 and Cayle et al. The rejection is traversed as follows.

Applicants provide remarks and evidence herein in the form of three new Declarations and two new references that specifically rebut the assertions made in the Final Office Action without raising any new issues for examination. The evidence presented now and previously in the present application show that the Examiner's interpretation of the Japan '299 reference is erroneous in view of the reading of Japan '299 by two biochemical expert Declarants, and in view of the knowledge of those of ordinary skill in the art as evidenced by the industry literature. The evidence overwhelmingly demonstrates that at the time of the present invention it was believed that enzymatic deinking below pH 8 would not function. Reconsideration and allowance are respectfully requested.

The Office Action cites Cayle et al. as teaching "cellulase enzymes from *Trichoderma viride* [as] known to aid in disintegration of waste paper including newsprint." (Office Action p. 3, lines 4-6). As noted in the Office Action, Cayle et al. does not disclose or suggest de-inking, i.e., detachment or removal of ink particles from the pulp, as presently claimed. The Examiner is inappropriately using hindsight in his determination that the use of the enzymes in Cayle et al. would have been obvious for use in deinking. The art must suggest the desirability of the modification. *See In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) ("The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art

suggested the desirability of the modification.") The reference which the Examiner argues suggests the use of enzymatic deinking outside of alkaline conditions, Japan '299, does not teach what the Examiner suggests. Cayle et al. only teaches the disintegration of the fibers, and not ink detachment or removal of ink particles, which are critical steps in de-inking. **As demonstrated by the submission of evidence herewith, at the time of the present invention it was thought that alkaline conditions were required for swelling the fibers to facilitate dissociation of the ink from the fibers**. With many inks on wastepaper, such as toner-based inks, it is possible to dissociate the paper fibers without detaching the ink. Hence it is not an aid in de-inking to simply disintegrate the fibers since key ink removal stages, such as flotation, require a separation of ink and fiber. Further underscoring the differences between detachment of ink from paper fibers and disintegration of the paper fibers is the fact that disintegrated fibers as taught by Cayle et al. may deleteriously result in smaller fibers causing slower manufacturing speeds, reduced production yield, reduced product strength and increased coarseness of the final paper product.

In the last Response, Applicants previously amended Claims 21 and 31 to include, as suggested by the Examiner, "a pH range of about 3 to less than 8 . . . ." Such an amendment relieves the present application from any overlap with the teachings of Japan '299. Applicants emphasize that Japan '299 enables only enzymatic deinking in an alkaline environment. The data and examples provided in the Japan '299 relate to deinking in the range of pH 8 – 11; note Example 1 teaching deinking at pH 10. Applicants' invention is a novel and unobvious improvement on the art as it existed as of 1989, as **the present invention demonstrates for the first time that enzymatic deinking can be performed in a non-alkaline medium**. As described in the parent application, United States Patent Application Serial No. 07/518,935, neutral deinking occurs in the pH range of 3 to 8. The Examiner's assertion that "neutral deinking" can only occur at pH 7 is unfounded in view of the specification.

The Office Action states that it would have been prima facie obvious to one of ordinary skill in the art to use the Japan '299 reference with the enzymes of Cayle et al. to achieve enzymatic deinking at a neutral pH. Applicant respectfully traverses this rejection by providing for the Examiner's review and consideration several additional pieces of evidence to rebut the

rejection based on §102(b)/103(a). First, Applicants provide a new Declaration of Dr. Karl-Erik Eriksson who possesses a Dr. Sci. degree in the field of biochemistry and has conducted extensive research in the fields of enzymology, microbiology, and biochemistry. Second, Applicants provide a Declaration by Mr. Harold Schmid, the Plant Manager at the Zwingen mill discussed in the previously submitted October 1993 Paper and Pulp International (PPI) article entitled "Neutral Deinking Makes its Debut" citing neutral deinking as being a new development three years after the priority date for the present application. Third and fourth, Applicants provide two publications bracketing the priority date of the present invention describing the conventional knowledge of deinking as always occurring in alkaline conditions. Fifth, Applicants provide a new Declaration of Dr. Douglas Eveleigh who is an expert in the areas of enzymology and biochemistry.

A prima facie case of obviousness can be rebutted by objective indicia of the lack of such obviousness. *See Graham v. John Deere Co.*, 383 U.S. 1 (1966). The Federal Circuit has expounded on the objective indicia of nonobviousness and held "acclaim by others" in the field of the invention's success to be such an objective indicia of nonobviousness. *See In re Dow Chem. Co. v. American Cyanamid Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988); *Burlingtom Indus., Inc. v. Quigg*, 822 F.2d 1581, 1584 (Fed. Cir. 1987). An article in a trade publication at least three years after the earliest priority date of the present invention which states very plainly that deinking at a neutral pH is new should be considered strong and convincing evidence to support the Applicants' assertions that the present claims would not have been obvious to one of ordinary skill in the art as stated by the Examiner.

When Applicants put forward additional evidence to rebut a rejection for obviousness, the Examiner must step back and **consider all evidence anew**. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). Declaration evidence, such as that from Dr. Eriksson, Dr. Eveleigh and Mr. Schmid, when accorded its proper weight as testimony of fact, can properly rebut the prima facie case of obviousness presented by the Examiner. *See In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996) (holding that even when the declarant uses the phrase "in my opinion" the declarant is stating a fact); *see also In re Morant*, 26 Fed. Appx. 929 (Fed. Cir. 2001).

As stated above, Applicants submit herewith as **Exhibit I** a new **Declaration of Dr. Karl-Erik Eriksson** in accordance with 37 C.F.R. §1.132. The new Declaration of Dr. Eriksson differs from his previously submitted Declaration by specifically addressing the full passage in Japan '299 cited by the Examiner in the Final Office Action, and therefore, presents no new issues for examination (*See* Japan '299 page 2 last full paragraph to page 3 end of carryover paragraph lines 1-5, and Declaration of Eriksson at ¶ 4). Dr. Eriksson has a Dr. Sci. degree in biochemistry and has been a professor and Eminent Scholar at the University of Georgia in Athens in the field of enzymology, microbiology, and biochemistry. Currently, Dr. Eriksson is in Sweden working to commercialize biological-based innovations in the pulp and paper industry. It is the expert opinion of Dr. Eriksson that the Japan '299 patent, read in its entirety, merely teaches one of ordinary skill in the art the successful use of alkaline deinking with enzymes – deinking in the pH range of 8.0 – 11.5 which was the norm. Dr. Eriksson believes that despite the overly broad and unsupported statement made in Japan '299 that the deinking enzyme could retain its activity in the alkaline range as well as the acid or neutral range, that as of the priority date of May 16, 1989, combining that disclosure with the knowledge possessed by one of ordinary skill of the art would not generate an expectation for the successful use of enzymes for removing ink from pulp in a non-alkali environment in particular in a pH range of between 3 to about 8.

Dr. Eriksson buttresses his conclusion on a thorough analysis of the Japan '299 specification. Specifically, Dr. Eriksson focuses on the language in Japan '299 dealing with the enzymes retaining activity in alkaline or acidic pH ranges which are a product of cellulase culture liquid originating from salting out, precipitation, dialysis, and gel fractionation. (Japan '299 page 2 last full paragraph to page 3 end of carryover paragraph lines 1-5, lines 1-5). Dr. Eriksson notes that the complete statement in Japan '299 that

> [a]ccordingly, this invention provides a de-inking agent for recycling old paper, containing cellulose. Cellulase commonly occurring in plants, animals, bacteria and fungi can be used in this invention without any special restriction, but alkaline cellulase is especially preferred. Alkaline cellulase is one have optimum pH 8.0 – 11.5 (preferably 8.1 – 11.0). Such

> enzyme retains its activity in the alkaline range as well as the acid or neutral range, e.g., a product purified and fractioned from cellulase culture liquid of various origins by salting out, precipitation, dialysis and gel fractionation . . .

refers to the non-alkaline conditions for purification of the enzymes and does not suggest using the enzymes for deinking under acidic or neutral pH ranges. (*See also* Declaration of Eriksson at ¶ 4.) Moreover, before the advent of the present invention deinking was believed to require alkaline conditions to facilitate the enzymatic component of that process. Enzymatic deinking was not previously performed in the absence of alkaline conditions because one of ordinary skill in the art would not have expected fiber swelling to occur. It was believed that without fiber swelling the detachment of ink from paper fiber would not have been effected. Therefore, it is Dr. Eriksson's expert opinion that neutral condition enzymatic deinking, in particular at a pH of between 3 to about 8, was neither taught, disclosed, nor suggested in the Japan '299 to one of skill in the art at the time of priority.

In the deinking art there are over twenty years of published, detailed studies from commercial, academic, and government laboratories that emphasize that chemical modification and treatment by alkali exposure is necessary for deinking. As an example, Applicants have previously provided the October 1993 Paper and Pulp International (PPI) article entitled "Neutral Deinking Makes its Debut" citing neutral deinking as being a new development three years after the priority date for the present application. The article explains how the first neutral deinking system began its operation in July of 1992, more than three years after the priority date of the present invention. The article further describes how the addition of alkalis such as sodium hydroxide to the pulp prior to or during deinking was standard and, at that time, thought to be required. Not only does this article buttress the Applicants' position that neutral deinking would not have been obvious at the time of invention, but it also serves as an objective indicia of nonobviousness, thus overcoming the prima facie case of obviousness altogether.

In response to the Examiner's argument in the Final Office Action that the PPI article does not prove that the invention was not known earlier, Applicants rebut the assertion with the

Declaration of Harold Schmid, attached hereto as Exhibit II.[1] However, Applicants must also note that the Examiner has not established that the PPI article indicates that non-alkaline deinking was known prior to the publication thereof. *See Plant Genetic Systems, N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1344 (Fed. Cir. 2003) (stating that the use of later publications to prove an earlier state of the art is acceptable).

As the Declaration of Mr. Schmid describes, he served as the Project Manager at the Zwingen mill in Switzerland to implement the neutral pH deinking described in the PPI article, and he was directly involved with the design, construction, and early operation of that new deinking plant which began operation in May 1993. In 1991, Mr. Schmid worked with the Zwingen mill owners to design the mill around a neutral deinking concept. It is his understanding and belief as one of skill and knowledge in the art at that time that the Zwingen mill was the first in the world intended to be built and run on a neutral deinking concept. According to Mr. Schmid there was no suggestion of non-alkali deinking at the Zwingen plant prior to 1991. The concept was tested and proven as effective in a pilot plant trial in 1991. The pilot plant trial created the proof to proceed with the design and the construction of the Zwingen deinking plant in 1992, which concluded with the start up of the deinking plant in May of 1993. Therefore, the PPI article combined with the Declaration of Harold Schmid in response to the issue raised in the Final Office Action stands as objective evidence that neutral deinking was not obvious at the time to which the application claims priority (i.e., the Korean application filed in 1989).

Contrary to the Examiner's repeated assertions that alkaline deinking was known prior to the present invention, the Applicants provide two additional publications evidencing the knowledge of one skilled in the art regarding deinking. **Exhibit III is an article entitled "Appropriate Chemical Additives Are Key To Improved Deinking Operations"**

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[1] This declaration is being provided at this time because Applicant believed the significance of the PPI article was apparent on its face and only in receiving the Final Office Action did the Applicant see the need for such supporting evidence. The Applicants point out that no new matter or issues are provided in this Declaration.

(Woodward, T.W., Pulp & Paper, November 1986, p. 59) stating at page 60 that "[h]igh concentrations of alkali (pH 11.5 to 12.0) can saponify and/or hydrolyze some ink vehicles and will swell fibers to aid in breaking up inks and coatings . . . inks on woodfree ledger, computer printout, book, and lightly printed board grades may be effectively removed and dispersed (with the use of other chemicals) at pH values in the range of 10 to 11."

Exhibit IV is a paper presented at the 1990 TAPPI Pulping Conference (McCormick, D., Chemistry of Floatation and Washing for Deinking Newsprint, p. 357 of Book 1 from the 1990 Pulping Conference) which describes deinking at low pH as being at 8 and high pH deinking at 10. The McCormick reference also describes the "swelling of fibers and opening of fibrils by alkali" as the cause of ink particles being removed from a paper surface. *Id.* at p. 360.

These references in Exhibits III and IV, which bookend the 1989 priority date of the present invention, further evidence that those of ordinary skill in the art believed that deinking could not be effectively performed at pH below 8. The specification of the present invention was the first to demonstrate the contrary.

Finally, Applicants provide for the Examiner's review the **Declaration of Dr. Douglas Eveleigh in accordance with 37 C.F.R. § 1.132 as Exhibit V**. The new Declaration of Dr. Eveleigh differs from his previously submitted Declaration by specifically addressing the full passage in Japan '299 cited by the Examiner in the Final Office Action, and therefore, presents no new issues for examination (*See* Japan '299, page 2 last full paragraph to page 3 end of carryover paragraph lines 1-5, and Declaration of Eveleigh at ¶ 4). It is Dr. Eveleigh's opinion that Japan '299 does not provide to those skilled in the art an expectation for the successful use of enzymes for removing ink from pulp in a non-alkali environment, despite the broad and unsupported statement that "any cellulase without restriction" may be used. (Office Action, p. 3, line 8). It is Dr. Eveleigh's opinion that this is true because Japan '299 only provides actual data for embodiments of deinking newspapers in alkaline conditions in Examples 1-3. The emphasis on an alkaline condition for deinking is epitomized in Japan '299 when the only cellulase

described with sufficient detail to practice is "[a]lkaline cellulase . . . having optimum pH 8.0-11.5 (preferably 8.1-11.0). (Japan '299, p. 2, last line).

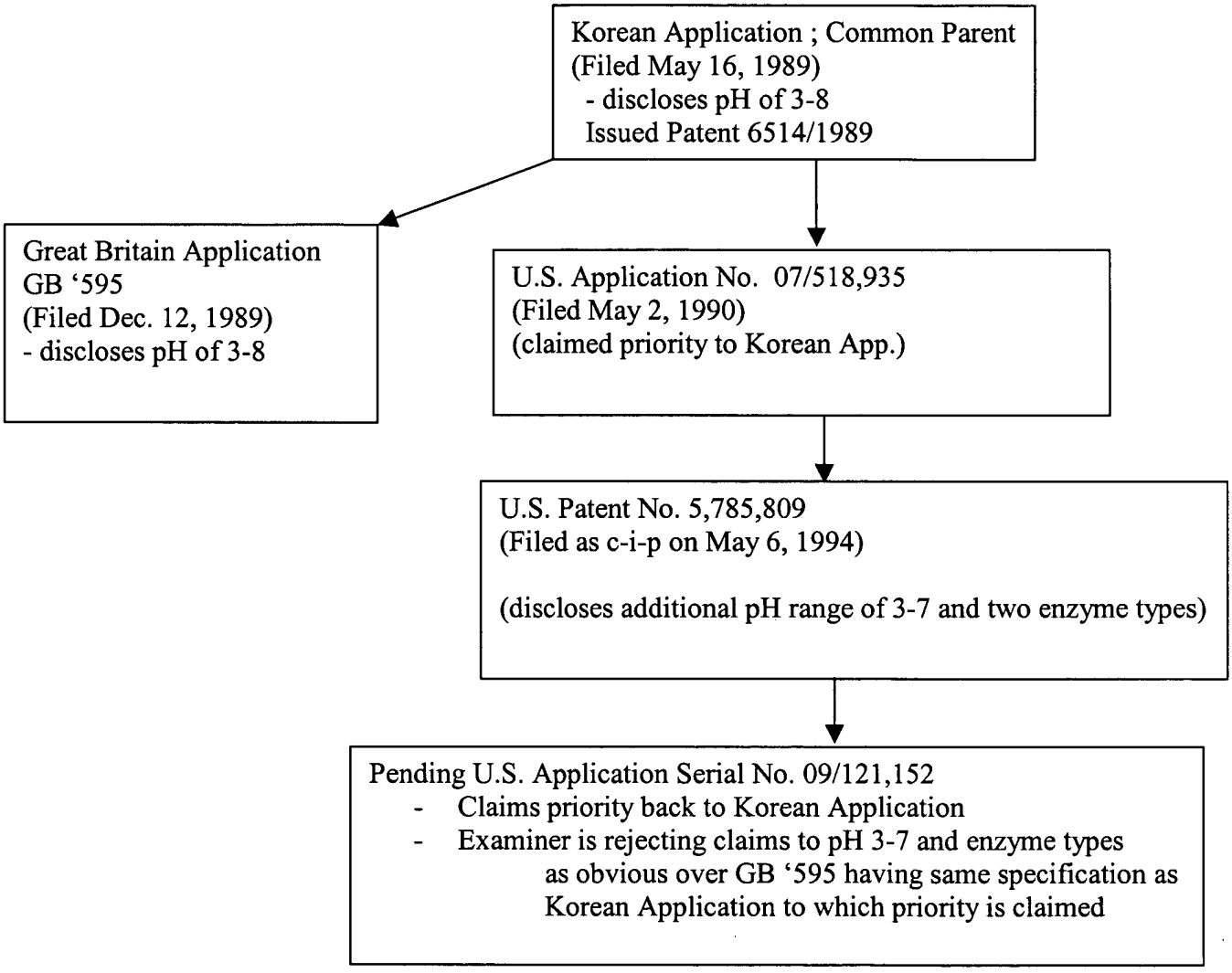
Prior to the description in the above-identified patent application, it was believed that alkaline conditions were necessary for deinking with enzymes in order to cause ink containing paper fibers to swell, which effect defiberization, ink detachment, and deinking. Absent alkaline conditions, one would not have expected swelling, and therefore adequate ink detachment and removal, to occur as a result of the addition of deinking enzymes alone in the pulping process. Therefore, to one skilled in the art of deinking at the time the priority application was filed in 1989, the deinking action of enzymes in a non-alkaline environment would have been extremely novel and surprising. It is Dr. Eveleigh's opinion that an expectation of successful use of deinking enzymes in an aqueous environment having a pH of less than 8 is not found in the '299 patent.

The collective evidence presented in the present application clearly demonstrates the non-obviousness of the present invention and clarifies the Japan '299 reference has been previously misinterpreted by the Examiner. According to *In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996), statements of expert witnesses are to be regarded as a factual allegation of the knowledge in the art and not merely opinion testimony. Therefore, based on the remarks herein and evidence in Exhibits I-V, Applicants respectfully ask that the Examiner allow the pending claims without delay.

B. Rejections Under 35 U.S.C. §102(b)/103(a) Combining GB 2,231,595 with Cayle et al.

Claims 26, 27, 35, and 37 were rejected in light of GB 2,231,595 ("GB '595") issued to Ow et al. and filed December 29, 1989, and if necessary, combining that reference with Cayle et al. Applicants respectfully traverse this rejection considering that the co-owned GB '595 is the daughter and mirror image of the May 16, 1989 Korean application which issued as Korean Patent 6514/1989, to which the present application also claims priority. The present application claims continuation-in-part priority to the 1989 Korean application. The GB '595 patent claims

priority to the 1989 Korean application on its cover. Therefore, GB '595 contains the same teaching regarding pH ranges and organisms as the 1989 Korean application to which the present application also claims priority. See the below priority diagram.



Applicants are entitled to claim priority for the subject matter in the Korean application even though there is an intervening U.S. continuation-in-part application disclosing additional information. If this were not the case, the use of continuation in part practice would destroy all priority chains. Applicants acknowledge that priority for the use of the specific enzymes as first claimed in the continuation-in-part is limited to that filing date; however, the claim of priority to the pH ranges of 3 to 8 survives from the time of the Korean filing to date. *See* MPEP § 201.09 (establishing claim of priority for continuation-in-part with continuity in at least one inventor, filed before the abandonment of the priority application, and contains specific reference to the priority application). The Examiner's argument that Applicants are not entitled to priority for the range of 3 to less than 8 is unfounded. The Korean application from which this application stems discloses a pH in the range of 3.0 to 8.0 and the use of enzymes to the same extent as GB '595. Therefore, the disclosure of the GB '595 application pH range and enzyme use which the Examiner states creates obviousness when combined with the specific enzymes of Cayle et al. is within the priority claim currently made by Applicants.

The present application is entitled to priority for common subject matter to the earlier Korean application. The pH range and enzyme use in GB '595 cannot be a prior art reference over the present application given the present claim of priority to the Korean application which extends back to before the GB '595 application was filed. Therefore, the Applicants respectfully request that the Examiner lift these rejections and issue the pending claims in light of the foregoing.

The Examiner is encouraged to call the undersigned attorney at 404-853-8081 if doing so will facilitate prosecution of the application. No additional fees are believed due, however, the Commissioner is hereby authorized to charge any fees due or credit any overpayment to Deposit Account 19-5029.

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